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PHASE I INSPECTION REPORT. NATIONAL DAM SAFETY PROGRAM. ROUND V--ETC(U)
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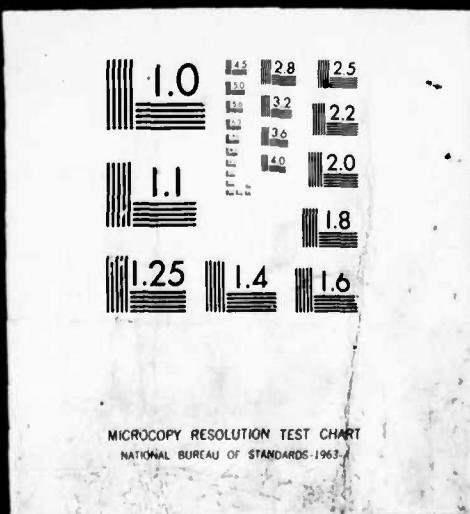
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LEVEL II

RARITAN RIVER BASIN

PREScott BROOK, HUNTERDON COUNTY

NEW JERSEY

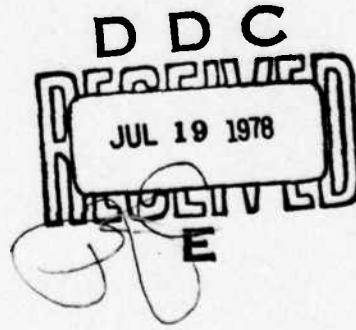
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ROUND VALLEY SOUTH DAM

PHASE I INSPECTION REPORT

NATIONAL DAM SAFETY PROGRAM

NJ 00015



DEPARTMENT OF THE ARMY
PHILADELPHIA DISTRICT, CORPS OF ENGINEERS
CUSTOM HOUSE - 2D & CHESTNUT STREETS
PHILADELPHIA, PENNSYLVANIA 19106

MAY 1978

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20. KEY WORDS (Continue on reverse side if necessary and identify by block number) National Dam Safety Program Dam Inspection Report Phase I Round Valley South Dam, N.J. Dams - N.J.		
21. ABSTRACT (Continue on reverse side if necessary and identify by block number) This report cites results of a technical investigation as to the dam's adequacy. The inspection and evaluation of the dam is as prescribed by the National Dam Inspection Act, Public Law 92-367. The technical investigation includes visual inspection, review of available design and construction records, and preliminary structural and hydraulic and hydrologic calculations, as applicable. An assessment of the dam's general condition is included in the report.		

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DEPARTMENT OF THE ARMY
PHILADELPHIA DISTRICT, CORPS OF ENGINEERS
CUSTOM HOUSE-2D & CHESTNUT STREETS
PHILADELPHIA, PENNSYLVANIA 19106

IN REPLY REFER TO

NAPEN-D

8 JUL 1978

Honorable Brendan T. Byrne
Governor of New Jersey
Trenton, New Jersey 08621

Dear Governor Byrne:

Inclosed is the Phase I Inspection Report for Round Valley South Dam in Hunterdon County, New Jersey which has been prepared under authorization of the Dam Inspection Act, Public Law 92-367. A brief assessment of the dam's condition is given on the first two pages of the report.

Based on visual inspection, available records, calculations and past operational performance, Round Valley South Dam is judged to be in fair condition. To insure adequacy of the structure, the following actions, as a minimum, are recommended:

a. Installation of piezometers should be initiated within one month from the date of approval of this report and a new stability analysis performed if the readings differ significantly from the design assumptions. In addition, the embankment should be monitored continuously for signs of increased seepage and/or turbid water.

b. Within one year from the date of approval of this report, the below noted actions should be initiated and substantially completed:

(1) The upstream slope protection should be repaired to provide a suitable well graded riprap layer.

(2) The sloughing of the embankment near the east abutment should be filled and graded. After repairs, it should be regularly monitored for further movement.

Two copies of the report are being furnished to Mr. Dirk C. Hofman, New Jersey Department of Environmental Protection, the designated State

NAPEN-D

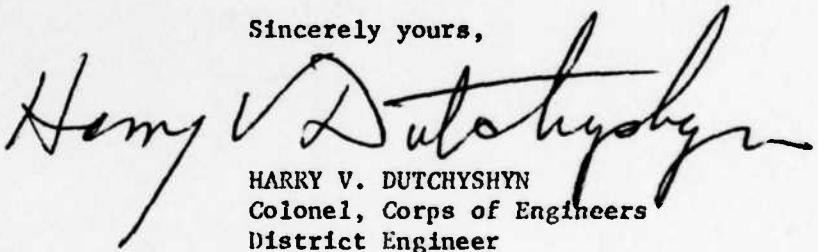
Honorable Brendan T. Byrne

Office contact for this program. Within five days of the date of this letter, a copy will also be sent to Congresswoman Helen S. Meyner of the Thirteenth District. Under the provisions of the Freedom of Information Act, the inspection report will be subject to release by this office, upon request, thirty days after the date of this letter.

Additional copies of this report may be obtained from the National Technical Information Services (NTIS), Springfield, Virginia, 22161 at a reasonable cost. Please allow four to six weeks from the date of this letter for NTIS to have copies of the report available.

An important aspect of the Dam Safety Program will be the implementation of the recommendations made as a result of the inspection. We accordingly request that we be advised of proposed actions taken by the State to implement our recommendations.

Sincerely yours,



HARRY V. DUTCHYSHYN
Colonel, Corps of Engineers
District Engineer

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As stated

Cy Furn:
Mr. Dirk C. Hofman, P.E.
Department of Environmental Protection

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RARITAN RIVER BASIN

**Name of Dam: Round Valley South Dam
County and State: Hunterdon County, State of New Jersey
Inventory Number: NJ 00015**

PHASE I INSPECTION REPORT

NATIONAL DAM SAFETY PROGRAM

**Prepared by: O'Brien and Gere Engineers, Inc.
Justin and Courtney Division**

**For: United States Army Corps of Engineers
Philadelphia District**

Date: May 24, 1978

**PHASE I REPORT
NATIONAL DAM SAFETY PROGRAM**

Name of Dam Round Valley South Dam

State Located New Jersey

County Located Hunterdon

Stream Prescott Brook

Dates of Inspections April 19 and April 24, 1978

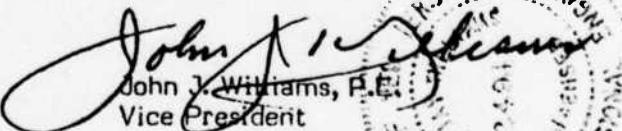
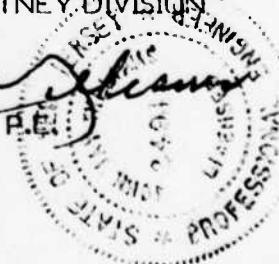
**ASSESSMENT OF
GENERAL CONDITIONS**

The Round Valley South Dam appears to be stable. However, areas of surface wetness, standing water, and seepage were observed on the downstream slope of the embankment, and were most evident along the berms and the lower third of the downstream slope near the east abutment. These observations indicate that the phreatic line may intersect the downstream slope above the filter blanket and rock toe. Piezometers should immediately be installed to monitor pore pressures throughout the embankment, and the resulting data evaluated and compared with design assumptions to determine the need for further analysis of embankment stability.

Inspection of the rock riprap, used for the upstream slope protection, revealed signs of rock size segregation and material deterioration. The riprap should be supplemented to provide a well graded, protective layer.

The appurtenant structures associated with the South Dam appear to be sound and are well maintained.

O'BRIEN & GERE ENGINEERS, INC.
JUSTIN & COURTNEY DIVISION


John J. Williams, P.E.
Vice President


Based on visual inspection, available records, calculations and past operational performance, Round Valley South Dam is judged to be in fair condition. To insure adequacy of the structure, the following actions, as a minimum, are recommended:

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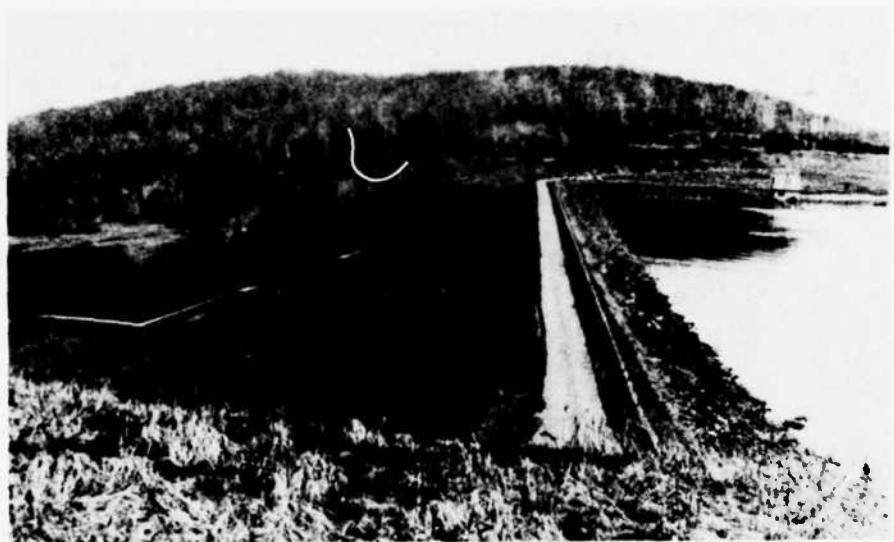
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APPROVED:

HARRY V. DUTCHYSHYN
Colonel, Corps of Engineers
District Engineer

DATE: 3 July 1978





OVERALL VIEW OF DAM



UPSTREAM FACE OF DAM

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PHASE I INSPECTION REPORT

NATIONAL DAM SAFETY PROGRAM

NAME OF DAM ROUND VALLEY SOUTH DAM ID# 00015

SECTION I - PROJECT INFORMATION

1.1 GENERAL

a. Authority - This report is authorized by the Dam Inspection Act, Public Law 92-367, and has been prepared in accordance with contract #DACPW61-78-C-0052 between O'Brien and Gere Engineers, Inc., Justin and Courtney Division, and the United States Army Corps of Engineers, Philadelphia District.

b. Purpose of Inspection - The purpose of this inspection is to evaluate the structural and hydraulic conditions of Round Valley South Dam and appurtenant structures, and to determine if the dam constitutes a hazard to human life or property.

1.2 PROJECT DESCRIPTION

a. Description of Dam and Appurtenances - Round Valley Reservoir is located in the foothills of Hunterdon County, about one mile south of Lebanon, New Jersey. The impoundment area was formed by the construction of two dams (North and South) and a dike. The North Dam is constructed across a tributary of the South Branch Rockaway Creek, which drains to the North Branch Raritan River. The Dike, which is about one-half mile west of the North Dam is constructed across a swale which drains toward the South Branch of Rockaway Creek. The South Dam is constructed across Prescott Brook which drains to the South Branch Raritan River.

According to the design drawings, by Porter, Urquhart, McCreary and O'Brien Round Valley South Dam is a rolled earth embankment which consists of the following types of materials:

- 1) Zone 1 Impervious Fill forms the core of the embankment and the backfill of the impervious core trench.
- 2) Zone 2 Fill forms a portion of the outer shells of the embankment. Specified compaction requirements are similar to those required for Zone 1, but the specified gradation requirements are suitable to a more pervious material than Zone 1.
- 3) Zone 3 Random Fill forms the remainder of the shell of the embankment. Specified compaction requirements vary depending on the degree of earth or rock fragments contained in the excavation from the borrow areas.
- 4) Downstream filter blanket and slope protection filter.
- 5) Rock toe and dumped rock slope protection.

The dam has a maximum height of about 178 feet and is approximately 1,395 feet long. The top width of the dam is 30 feet, and consists of an 11 foot wide bituminous surfaced roadway with 9.5 foot wide, grass covered shoulders on each side. The upstream slope is 3:1 (horizontal:vertical); the downstream slope is 2.5:1 and is provided with three gutter berms and a wide, Random Fill toe berm sloped at approximately 5 per cent (20:1). Refer to Figure 5 for details concerning transverse sections of the embankment.

A rectangular concrete Intake Tower (35 feet by 29 feet) is located at the west abutment. Water is pumped from the Raritan River and transported through a 10 foot diameter conduit to the intake tower. The tower contains a common intake shaft with three sluice gates located side by side at Elevation 340.0. Separate shafts are provided for each gate with outlet portals at four elevations and guides for trash racks and stop logs. Refer to Figure 6 for details concerning the intake tower plan.

The dam and appurtenant structures are owned and operated by the New Jersey Department of Environmental Protection, Division of Water Resources. The primary purpose of the structures is impoundment of water to supplement the water supply of north central New Jersey. The reservoir area has also been developed as a recreation area.

The structures for Round Valley Reservoir project were designed by Porter, Urquhart, McCreary, and O'Brien, Consulting Engineers, of Newark, New Jersey. The construction application was submitted to the State of New Jersey, Department of Conservation, Division of Water Policy and Supply, on March 1, 1961, and approval was granted on May 31, 1961. On March 30, 1961 the construction contract for the North Dam, the South Dam, and the Dike was awarded to C.J. Langenfelder and Son, Inc., of Baltimore, Maryland. Specifications and design drawings for the project were available for review, but details concerning the construction history were limited. The original design for the gutter berms was found to be unacceptable. In 1970, the stone rubble gutter berms were replaced with concrete gutters.

b. Size Classification - The Round Valley Reservoir was designed for a storage volume of 55 billion gallons (168,000 acre-feet) at the maximum operating pool elevation of 385 feet mean sea level (MSL). The maximum height of the South Dam is 178 feet. Since the normal storage volume exceeds 50,000 acre-feet, the dam is in the large size category as defined by the Recommended Guidelines for Safety Inspection of Dams.

c. Hazard Classification - The South Dam, together with the North Dam and the North Dike, creates an impoundment with a capacity of 168,000 acre-feet. Failure of the South Dam could release a flood wave of extreme magnitude and duration, and could cause serious damage to homes, highways, railroads, and public utilities located downstream of the dam. Although the valleys of Prescott Brook and South Branch Raritan River are sparsely populated for several miles below the dam, the potential for loss of life can be considered high. Therefore, the Round Valley South Dam is in the high hazard category as defined by the Recommended Guidelines for Safety Inspection of Dams.

1.3 PERTINENT DATA

(from information supplied by New Jersey Department of Environmental Protection).

a. Drainage Area - The drainage area of the Round Valley Reservoir is about 5.4 square miles, as determined by use of United States Geological Survey, quadrangle sheets (7.5 minute) for Flemington, New Jersey, and Califon, New Jersey. The surface area of the reservoir at the maximum operating pool (Elevation 385.0) is about 3.6 square miles.

b. Discharges - Discharge from the reservoir is accomplished through operation of sluice gates located in the North Dam Outlet Tower.

A statutory conservation discharge of .83 million gallons per day must be maintained to Prescott Brook.

Round Valley is a pumped-storage water supply reservoir and construction of a spillway was not considered necessary.

c. Reservoir Data

Maximum Operating Pool (Reservoir at Elevation 385.0)

Length - 8,000 feet (maximum)
Area - 2,300 acres
Volume - 168,000 acre-feet

Top of Dam (Elevation 395.5)

Length - 8,000 feet (maximum)
Area - 2,400 acres
Volume - 193,000 acre-feet

Maximum Pool (PMF - Elevation 388.0)

Length - 8,000 feet (maximum)

Area - 2,300 acres

Volume - 175,000 acre-feet

d. Dam Data

Type - earth embankment

Top Elevation - 395.5 feet

Streambed elevation at centerline of dam - 218.0 feet

Length - 1,395 feet

Top width - 30 feet

Side slopes - upstream slope 3:1 (horizontal to vertical);
downstream slope 2.5:1

Zoning - Three zones as explained in Section 1.2.a.

Impervious core - Zone 1 material

Cutoff - A 4-foot thick concrete cutoff from the bottom of the
core trench to sound rock

Grout curtain - Grouting of the rock foundation was specified
along the centerline axis of the South Dam.

Specified grout holes were spaced at 10-foot
centers along the axis, and staggered 1.5 feet about the axis.
The specified depth of zoned grouting varied from 30 feet to 60
feet.

e. Outlet Works - A 36 inch diameter steel pipe is constructed under
the reservoir from the upstream toe to a valve vault located at the
downstream toe. In the vault, a series of reducers and valves connect the 36
inch pipe to a 12 inch pipe with a 12 inch hydraulic valve operated by
reservoir pressure. At the upstream end of the 36 inch pipe is an
electrically operated valve controlled from the intake tower. The valve
vault is used to assure the minimum conservation discharge to Prescott
Brook. All other outlet works associated with the reservoir are located at
the North Dam.

f. Engineering Data - The information available for review of Round
Valley South Dam included:

- 1) A set of forty-two drawings for the Round Valley Reservoir
Project, South Dam, Tunnel, and Appurtenant Structure (Contract RV-
1).

- 2) Special Report 15, State of New Jersey, Department of Conservation and Economic Development, August 1958.
- 3) Contract RV-1, State of New Jersey Department of Conservation and Economic Development, Division of Water Policy and Supply.
- 4) Correspondence, Inspection Reports, and Miscellaneous Reports.
- 5) Documents supplied by the Bureau of Water Facility Operations, Clinton, New Jersey (See page A10).

SECTION 2 VISUAL INSPECTION

2.1 FINDINGS

a. General - The field inspection of the embankment of the South Dam took place on April 24, 1978. The tunnel, intake tower, and valve vault associated with the South Dam were inspected on April 19, 1978. The reservoir water surface elevation was about 381 feet Mean Sea Level during both inspection visits. No underwater areas were inspected.

b. South Dam The riprap on the upstream face of the dam is poorly graded mix of large angular rocks (2 to 4 feet in diameter) and small rocks (6 inches or less in diameter). There is little uniformity in the distribution and placement of the rock. The upper portion of the embankment appears to differ from the design drawings. The drawings indicate a 3:1 slope for the upstream face with no berms. The visible portion of the upstream face appeared to have a steeper slope (about 2:1) and a 10 to 15-foot bench just below the water surface. Where the west abutment riprap terminates into the earth material, some minor undercutting of the abutment has occurred. However, the shoreline at the abutment appears to be in good condition. Several depressions of about 6 inches were observed on the roadway at the top of dam.

On the downstream slope, minor seepage was observed 100 feet from the west abutment along the top berm. According to Mr. Gregory Chase, Supervising Engineer, at the Bureau of Water Facilities Operations, in Clinton, New Jersey, the seepage dries up in late summer. A wet area was also noted approximately 6 feet above the top berm and about 200 feet from the east abutment.

There is a perceptible raised surface in the downstream slope between the top berm and the second berm. The rise appeared to be about 18 inches high for a length of 200 to 300 feet. A number of animal burrow holes were observed near the junction of the second berm and the east abutment.

Standing water was noted along the third or lower berm and in tracks or furrows that were, according to Mr. Gregory Chase, made by the equipment used to cut the grass on the downstream slope. The amount of seepage or standing water was significant at the east end of the embankment; below the third or lower berm, the condition of the grass and topsoil indicated a very moist or wet condition. Below the riprap, observed at the base of the random fill, water is discharging from the embankment or foundation. The discharge is estimated at about one cubic foot per second.

A rectangular weir with a removable "V" notch is constructed across Prescott Brook.

c. Intake Tower and Tunnel - The Intake Tower appears to be in excellent condition. The gates could not be operated during the inspection, but Mr. Chase stated that no problems have been encountered during gate operations. The assemblies and motors show no signs of deterioration or excessive wear. A mobile gasoline operator is available for use, in case of an electrical failure. The inspection team walked the 10-foot diameter intake tunnel from the manhole on the downstream side of the embankment to the tower. The tunnel appears to be in good condition. Some insignificant seepage through the tower wall was noted at the base of the intake tower.

d. Valve Vault - The valve vault located at the downstream toe of the embankment also appears to be in excellent condition. A 36 inch diameter steel pipe from the reservoir terminates at the valve vault. A 12 inch diameter pipe is connected to the 36 inch pipe through a series of reducers and valves. The 12 inch pipe rests on concrete saddles and is shimmed with cinder blocks and wood. A 12 inch hydraulic valve is used to control discharges to Prescott Brook.

e. Reservoir Area - The natural valley walls surrounding the reservoir have moderate slopes and are well covered with trees and brush. A dike has been constructed across a narrow portion of the reservoir in the northwest corner. The dike separates a swimming area from the main body of the reservoir.

f. Downstream Channel - Prescott Brook originates at the toe of the South Dam. The valley of Prescott Brook is relatively uninhabited. The confluence of Prescott Brook with the South Branch Raritan River is about 4 miles below the dam.

SECTION 3 - HYDROLOGY AND HYDRAULICS

The design flood used for the Round Valley Reservoir structures is the Probable Maximum Flood (PMF), according to the Recommended Guidelines for Safety Inspection of Dams. The reservoir surface at the maximum operating level (Elevation 385.0), comprises about two-thirds of the drainage area. Spillways were not considered necessary in any of the project structures, since the freeboard included allowance for storage of the PMF. The PMF was derived from the adjusted 48 hour Probable Maximum Precipitation (PMP). The volume of rainfall (PMP) that falls on the land portion of the basin was added to storage after adjustment for losses. The volume of rainfall (PMP) that falls on the reservoir portion of the basin was added to storage assuming no losses. The 48 hour PMP would raise the reservoir water surface about 3 feet. The minimum allowable freeboard at maximum pool is estimated at 4.4 feet.

The embankment is provided with 10.5 feet of freeboard above the maximum operating pool. Therefore, no difficulty is to be anticipated in adequately storing the rainfall excess of a storm less than or equal to the PMP.

According to Mr. Chase, water releases are restricted to a maximum of 600 million gallons per day (mgd) through the release works on the North Branch Rockaway Creek and 20 mgd through a bypass line in the pump station on the Raritan River. Mr. Chase added that the maximum discharge into Rockaway Creek could cause severe downstream erosion. Therefore, the reservoir can be drawn down about one foot per day. If a large drawdown were immediately necessary, the pumps at the Raritan River pump station would have to be removed.

SECTION 4 STRUCTURAL STABILITY

4.1 VISUAL OBSERVATIONS AND DATA REVIEWS

Design calculations for the South Dam were provided by personnel of the New Jersey Department of Environmental Protection, Division of Water Resources, Bureau of Water Facility Operations, Clinton, New Jersey.

The flow net and stability analyses were performed by the design engineering firm (Porter, Urquhart, McCreary and O'Brien) for the maximum operating pool condition (Elevation 385.0) and for rapid drawdown from Elevation 385.0 to Elevation 300.0. Sliding circles with various radii were analyzed for both the upstream and downstream slopes, with the downstream slope analyzed for horizontal to vertical permeability ratios ($K_h : K_v$) of 2.25 and 9.0. Determination of the most critical circle was made by assuming friction angles of 15, 20 and 25 degrees for circle groups of various radii. Cohesion values necessary to give a constant factor of safety were computed using an abbreviated method of slices for the stability analyses. For a given friction angle, the maximum required cohesion value indicated the radius of the most critical circle. The conventional method of slices was then applied to the critical circle. For the downstream slope, the factor of safety was computed as 1.62 with the ratio of horizontal to vertical permeabilities ($K_h : K_v$) assumed to be 9.0. For the upstream slope, the factor of safety was computed as 1.53.

The flow net for the South Dam was constructed using a graphical method, assuming the embankment to be homogenous and the filter blanket drains to be operable. The design discharge for the drain was three times the calculated seepage (.002 cfs or .9 gallons per/minute). However, during the inspection, the flow appeared to be about 1cfs, which is well in excess of the filter drain design flow.

The design calculations for the Intake Tower appeared to be satisfactory. The structural loadings used in the design of the tower were for the reservoir at Elevation 300.0 and a wind velocity of 70 miles per hour, and for the maximum ultimate water level of 410.0 feet based on future expansion. (See Figure 4).

A comprehensive review of the structural design calculations is beyond the scope of this investigation.

4.2 GEOLOGY AND SEISMIC STABILITY

The South Dam is located in the Piedmont physiographic province, a lowland containing gently rounded hills and wide valleys. The reservoir is essentially formed by Cushetunk Mountain, a horseshoe shaped Triassic diabase intrusion bounded on the west by Triassic, Paleozoic and older rocks. The dam is located across Prescott Brook in a gap which was carved out of the faulted contact between a diabase to the east and much older gneissic rocks to the west. The east abutment is formed by the diabase; the valley section foundation by faulted, crushed, diabase and gneiss with some indurated Triassic shales; and the right abutment by gneiss and other metamorphic rocks. Investigations made during the design of this structure indicated that the materials were weathered deeply and interstices filled with clay, forming a relatively tight foundation. Springs, which were reported in the investigations, were treated during construction. However, at the time of the inspection, water was observed flowing from the rock toe or foundations in excess of the design flow.

Although the area contains several faults, which were noted in geologic reports prepared during the design phase, they are considered to be very old and inactive, and should pose no problem to the stability of the dam.

The dam is located within Seismic Risk Zone 1 of the Seismic Zone Map of Contiguous States, and it appears that static stability calculations are satisfactory for design.

SECTION 5 -ASSESSMENT/REMEDIAL MEASURES

5.1 ASSESSMENT

The South Dam embankment appears to be stable. However, the signs of moisture and wetness on the downstream slope, especially at the lower third of the east side, indicate that the phreatic line may intersect the embankment slope at a point well above the filter blanket or rock toe. However, it is possible that the rainfall that occurred previous to the inspection may have been partially responsible for this condition. Since there are no piezometers installed in the embankment, the magnitude of pore pressures cannot be assessed.

The riprap on the upstream slope is poorly graded and inadequate to provide the necessary protection against erosion due to wave action. The riprap stone appears to have been susceptible to stress release or frost-wedging against fracture planes. According to Mr. Chase, considerable deterioration of the rock has occurred since its placement at the time of construction. Subsequent wave action has left portions of the embankment unprotected.

The appurtenant structures associated with the South Dam appear to be in excellent condition and should not adversely affect the safety of the embankment.

5.2 REMEDIAL MEASURES

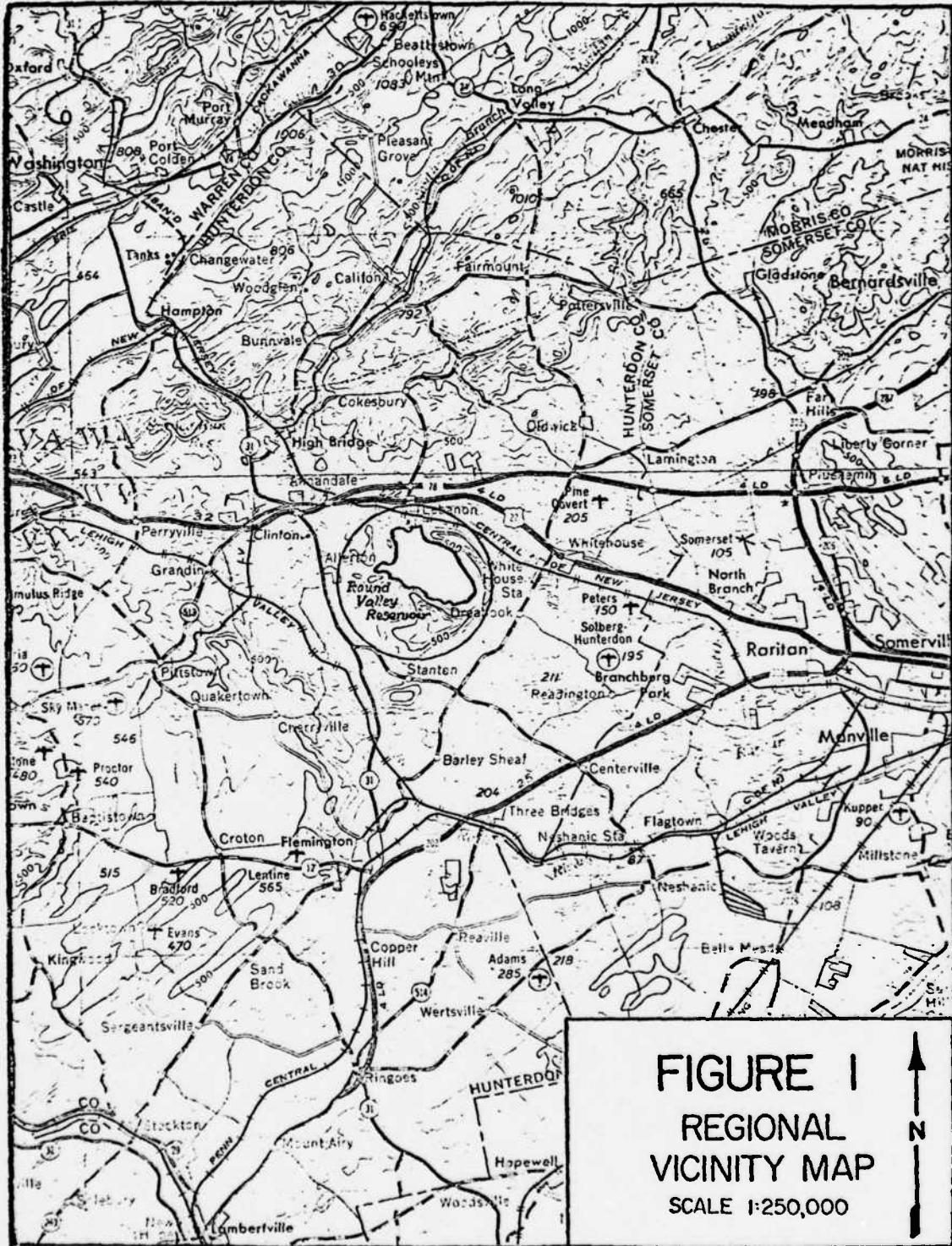
The upstream slope proection for the South Dam should be supplemented with large and medium sized rock to provide a suitable well graded riprap layer.

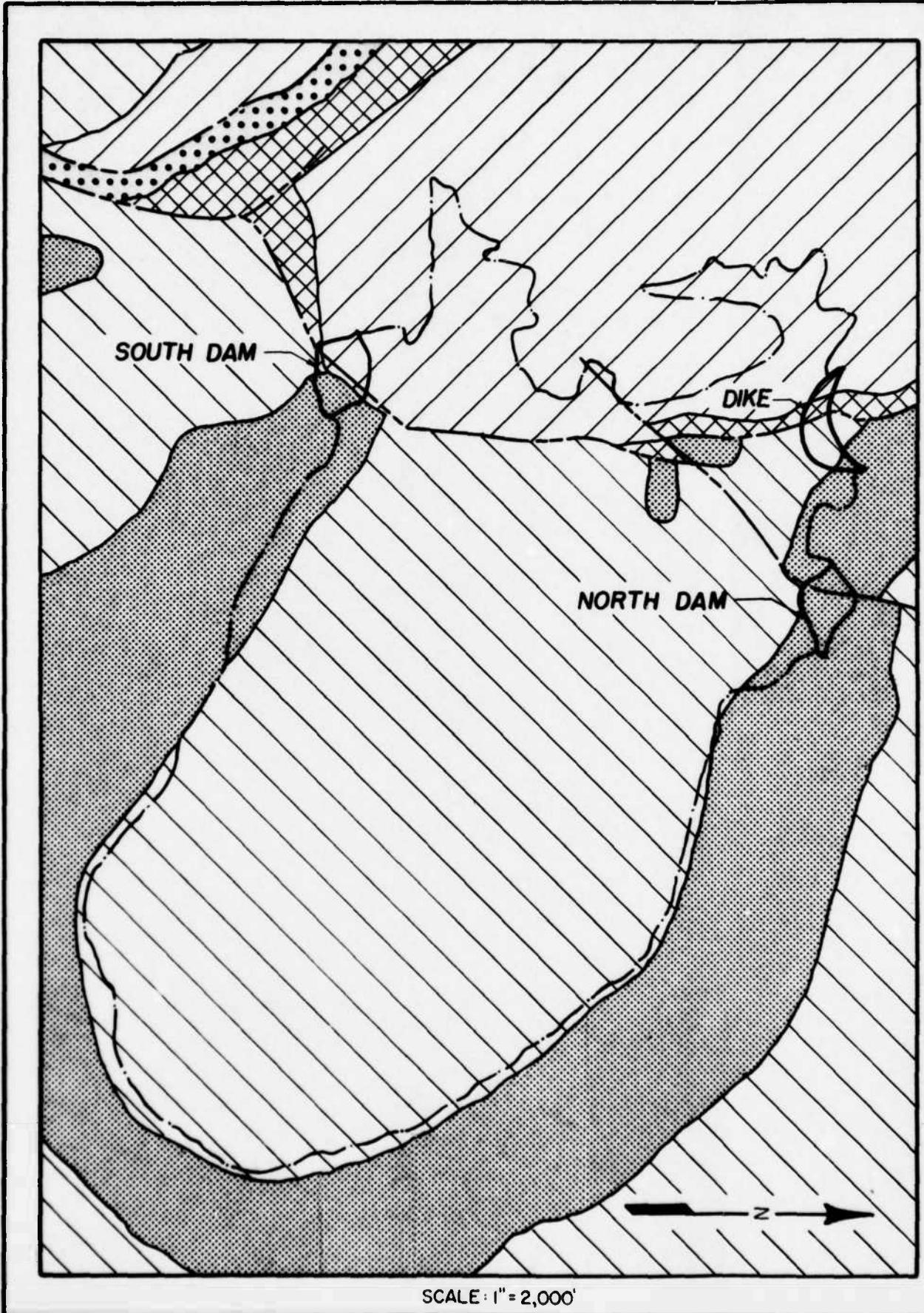
The embankment of the South Dam should immediately be equipped with piezometers to monitor the pore pressure development throughout the embankment.

If pore pressures shown by the piezometers differ significantly from those assumed in the design flow nets and stability studies, new embankment stability analyses should be performed using the pore pressure distribution based on the piezometer data.

The embankment of the South Dam should be monitored continuously for signs of increased seepage rates and/or turbid water.

FIGURES





2

NORTH DAM

DIKE

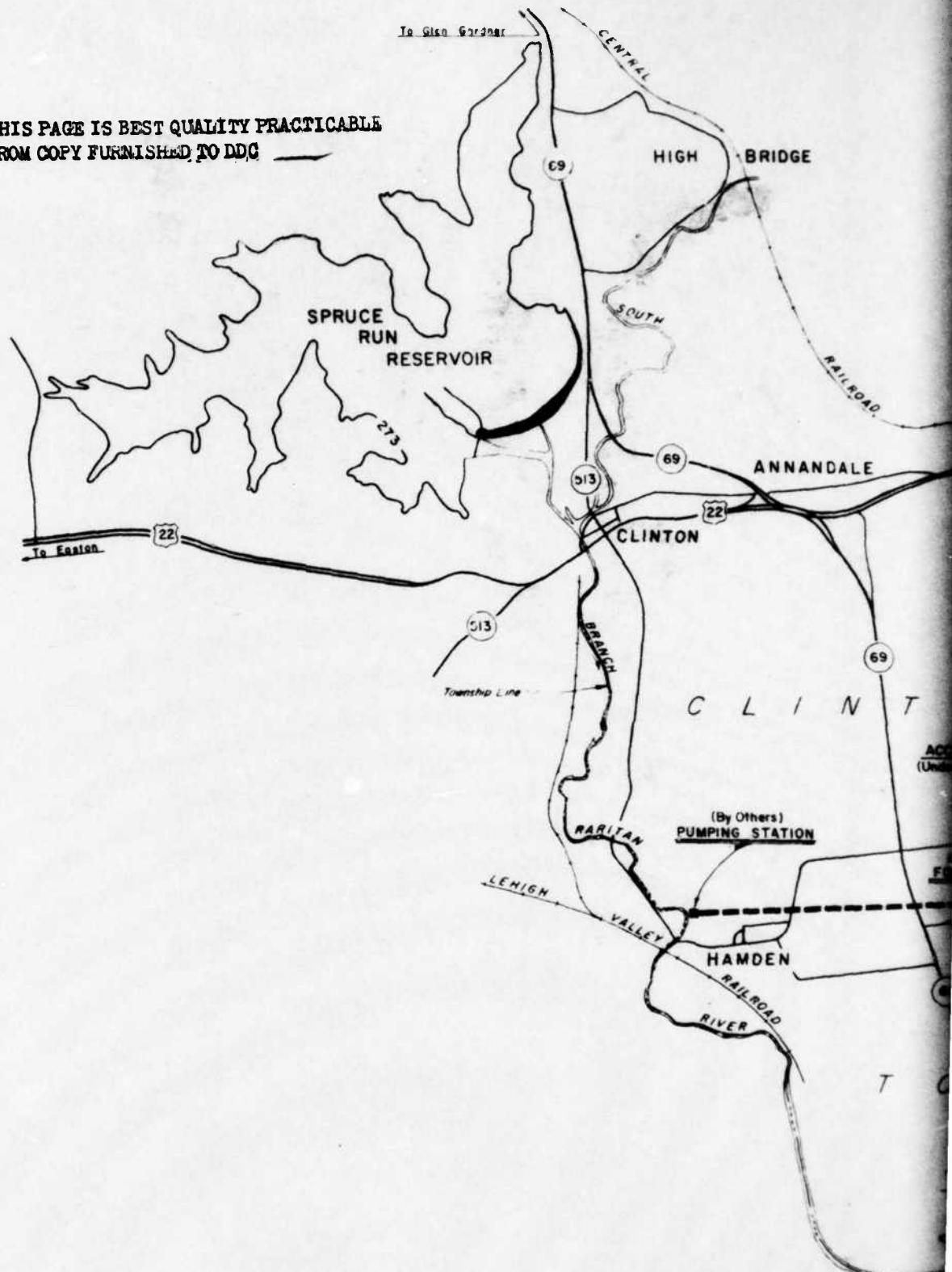
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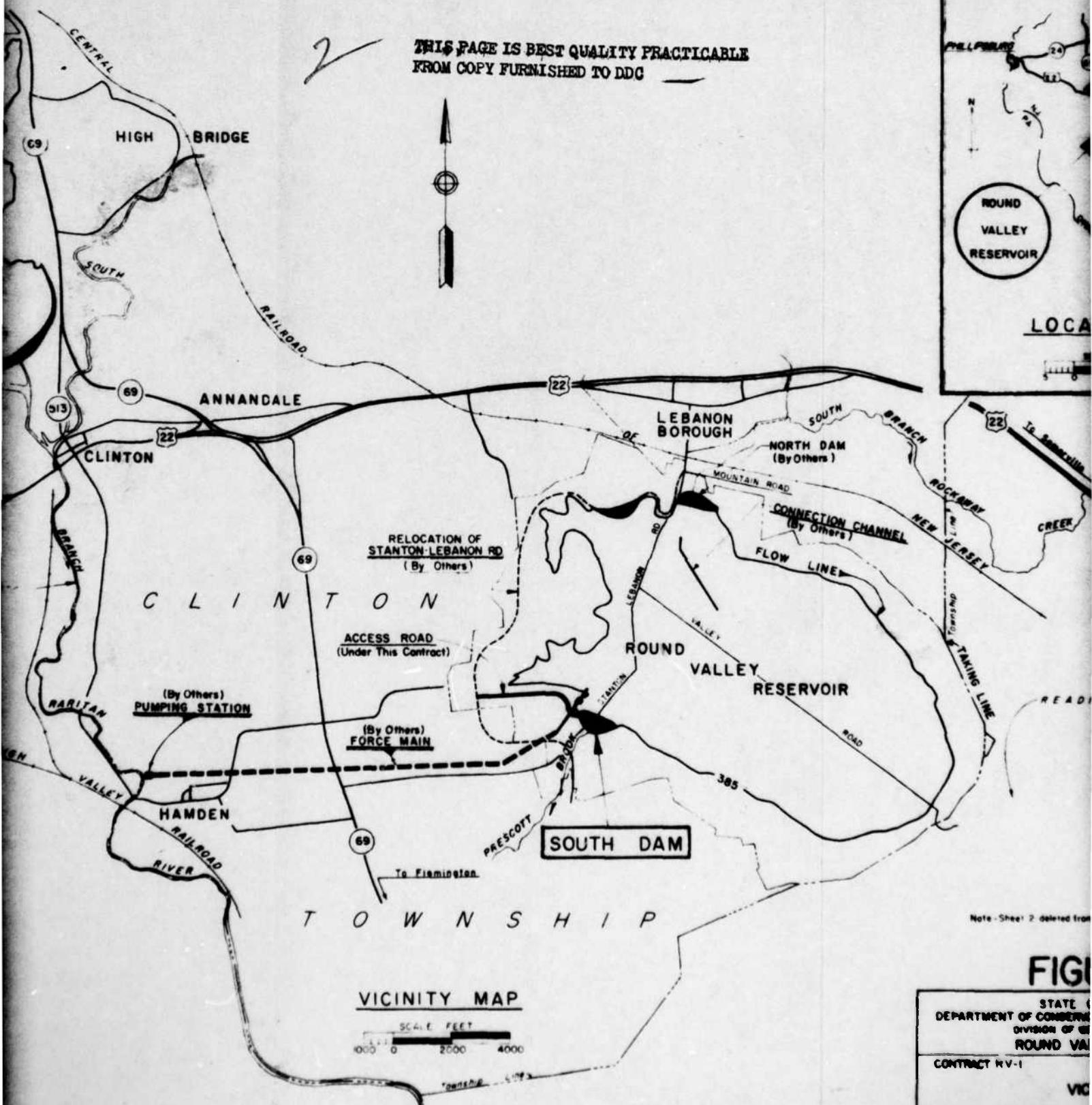
- BRUNSWICK FORMATION- Red Shale and Sandstone, Triassic
- KITTATINNY LIMESTONE- Cambro-Ordovician
- HARDYSTON QUARTZITE- Cambrian
- GNEISS - Pre-Cambrian
- DIABASE - Triassic
- FAULT
- DESIGN FLOW LINE

FIGURE 2
GEOLOGIC MAP

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2
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FIG

STATE	DEPARTMENT OF CONSERVATION
DIVISION OF WATERSHEDS	ROUND VALLEY
CONTRACT RV-1	
VICINITY MAP	
PORTER, LURKIN & CO., INC.	CONSULTING ENGINEERS
Scale: 1:250,000	Scale: 1:250,000
Date: 1964	Date: 1964

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DDC

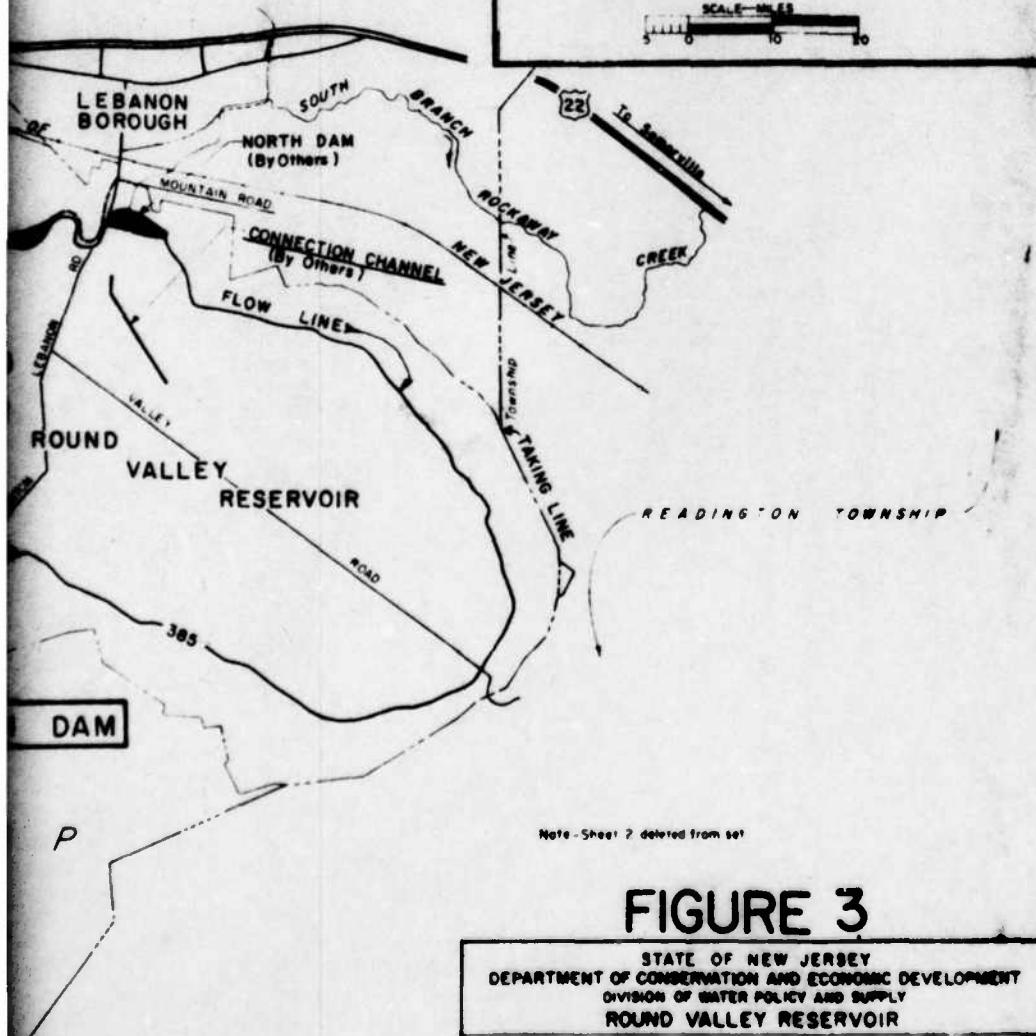
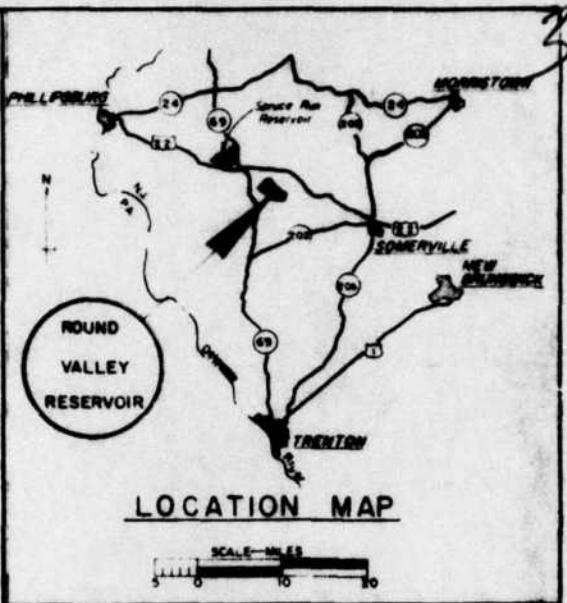


FIGURE 3

STATE OF NEW JERSEY
DEPARTMENT OF CONSERVATION AND ECONOMIC DEVELOPMENT
DIVISION OF WATER POLICY AND SUPPLY
ROUND VALLEY RESERVOIR

CONTRACT RV-1

SOUTH DAM

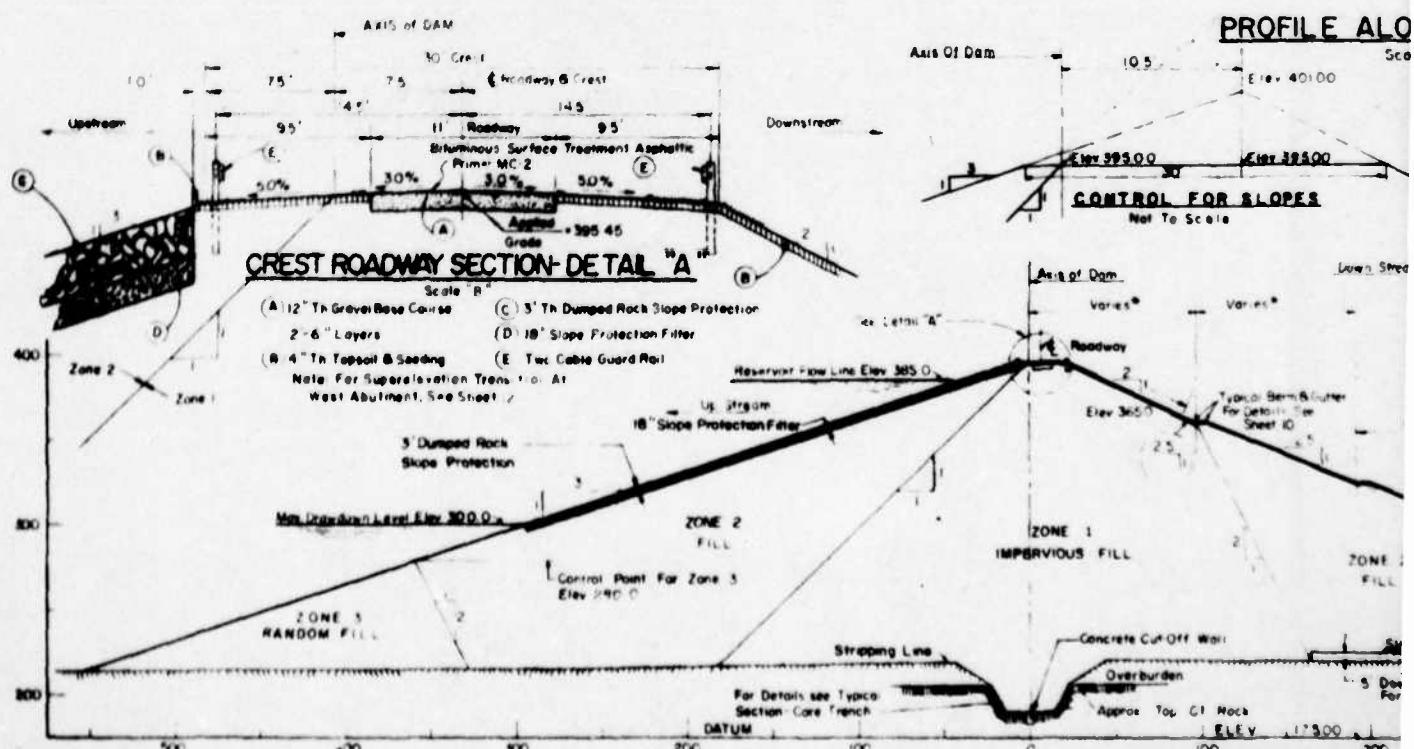
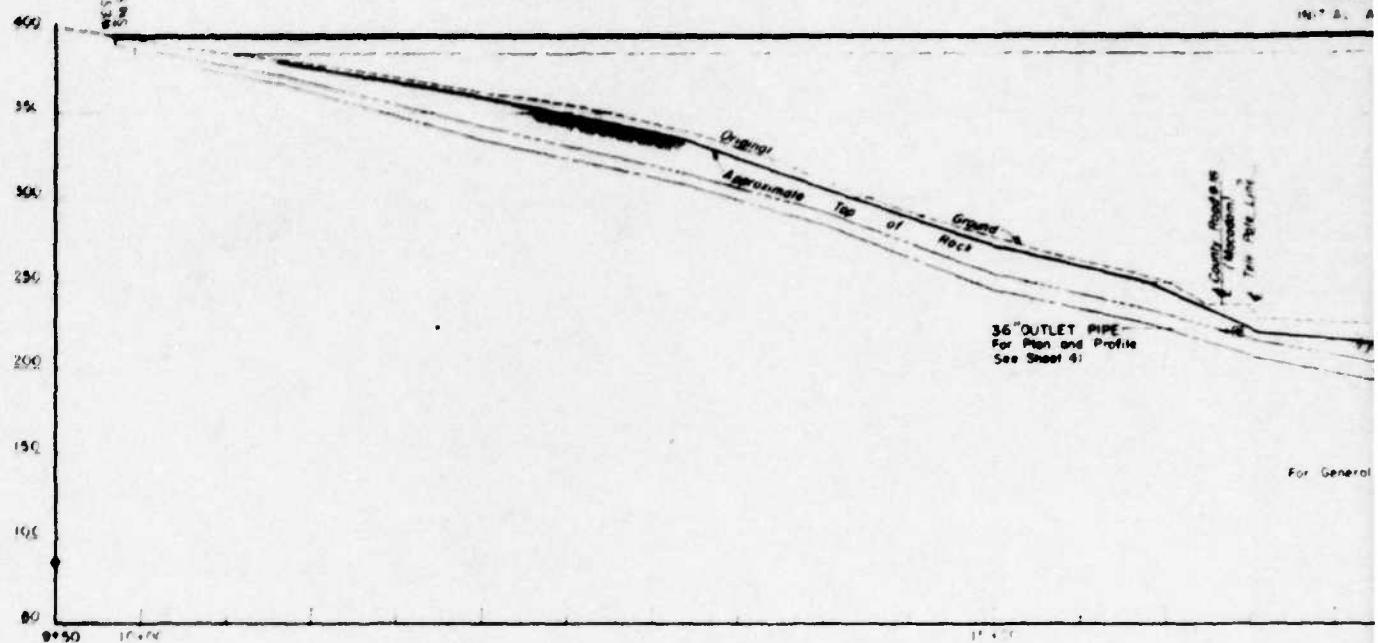
VICINITY MAP

PORTER, UNQUHART, MCCREAIR, & O'BRIEN
CONSULTING ENGINEERS
NEWARK, N.J.

CHARGE D.E. APPROVED	SCALE 1:2000	SHEET 3 of 60
DRAFTER DRAWN CHECKED	DATE Feb 4, 1961	ACC. PLUMO-KDR
PBH	PBH	LC

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Ultimate
Ref. 7-8-A



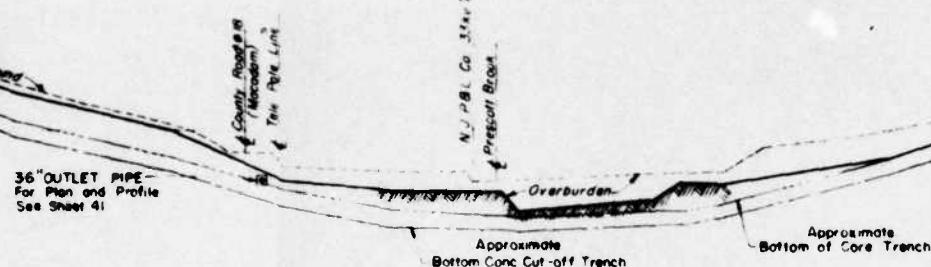
STICABLE

Ultimate Axis of Dam Elevation 420.00
Initial Axis of Dam Elevation 345.27

Ultimate Flow Line Elevation 410.00

END OF DRAWING

INITIAL FLOW LINE 385.00



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For General Plan of Dam See Sheet 7

NOTE: Field Investigations Show That Generally The Upper Portion Of The Rock Formation Is Decomposed, Seamed, & Fractured With These Characteristics Lessening With Increased Depth.

PROFILE ALONG DAM AXIS

Scale "A"

Elev 401.00

Slope Break As Ordered By The Engineer

Axis of Dam

Original Ground

CONTROL FOR SLOPES

Not To Scale

Approx Bottom of Core Trench

Excavate to Sound Rock as directed by the Engineer

Concrete Cut-off Wall

ESTIMATED C STATIONS

9+873	-	10+000
10+80	-	20+71
20+77	-	31+68
21+97	-	23+68

NOTE: Depths of Core 1 Station As Increased, Follow The Specifications

TYPICAL SECTION-CORE TRENCH

Not to Scale

Note: Limit Of Payment For Rock Excavation In Cut-Off Trench And Poured Concrete To Be Near Lines As Shown Above Or As Ordered By The Engineer. Limit Of Payment For Excavation And Zone 1 Impervious Fill (In Core Trench) To Be Near Lines As Shown Above Or As Ordered By The Engineer.

ZONE 1 IMPERVIOUS FILL

ZONE 2 FILL

Horizontal Line

FIG

STATE DEPARTMENT OF CONSERVATION DIVISION OF ROUND V

CONTRACT RV-1

PROFILE

PORTER, URGUM CONSULTING ENGINEERS

IN CHARGE C.F. GREEN	SCALE
ENRIGU TRADCO	1:1000
B.J.D. B.J.D. L.C.	DATE

TYPICAL SECTION

Scale "A"

Walter J. Green
CHIEF CONSTRUCTION ENGINEER
BUREAU OF DESIGN & CONSTRUCTION

G. J. Green
PORTER, URGUM, INCREDAY & O'BRIEN

Ultimate Flow Line Elev 410.00

INITIAL FLOW LINE 385.00

Ground
Original
Trench

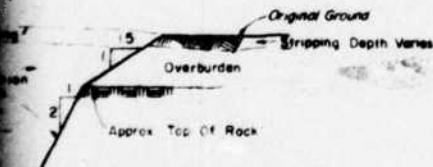
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NOTE: Field Investigations Show That Generally
The Upper Portion Of The Rock Formation
Is Decomposed, Seamed, & Fractured With
These Characteristics Lessening With Increased
Depth.

490
480
470
460
450
440
430
420
410
400
390
380
370
360
350
340
330
320
310
300
290
280
270
260
250
240
230
220
210
200
190
180
170
160
150
140
130
120
110
100
90
80
70
60
50
40
30
20
10
0

28+00

of Dam



CORE TRENCH

Rock Excavation in Cut-Off Trench
To Be Measured As Shown Above Or
Under Limit Of Payment For
Impervious Film In Core Trench To Be
Above Or As Ordered By The Engineer

Toe 5' Toe Ditch
Details See Section GG Sheet 10

600

400
300
200

ESTIMATED CORE TRENCH EXCAVATION LIMITS

STATIONS	ESTIMATED DEPTH (After Stripping)
9+87.3 — 10+60	10'
10+60 — 20+77	25'
20+77 — 21+97	20'
21+97 — 23+88.50	10'

NOTE: Depths of Core Trench Shall Be Increased Or Decreased From
Depths Shown As Directed By The Engineer. If The Depths Are
Increased, Payment Will Be As Specified In Section 3.3.1 Of
The Specifications.

Scale "A" Feet
0 25 50 100

Scale "B" Feet
0 5 10

FIGURE 4

STATE OF NEW JERSEY
DEPARTMENT OF CONSERVATION AND ECONOMIC DEVELOPMENT
DIVISION OF WATER POLICY AND SUPPLY
ROUND VALLEY RESERVOIR

CONTRACT RV-1

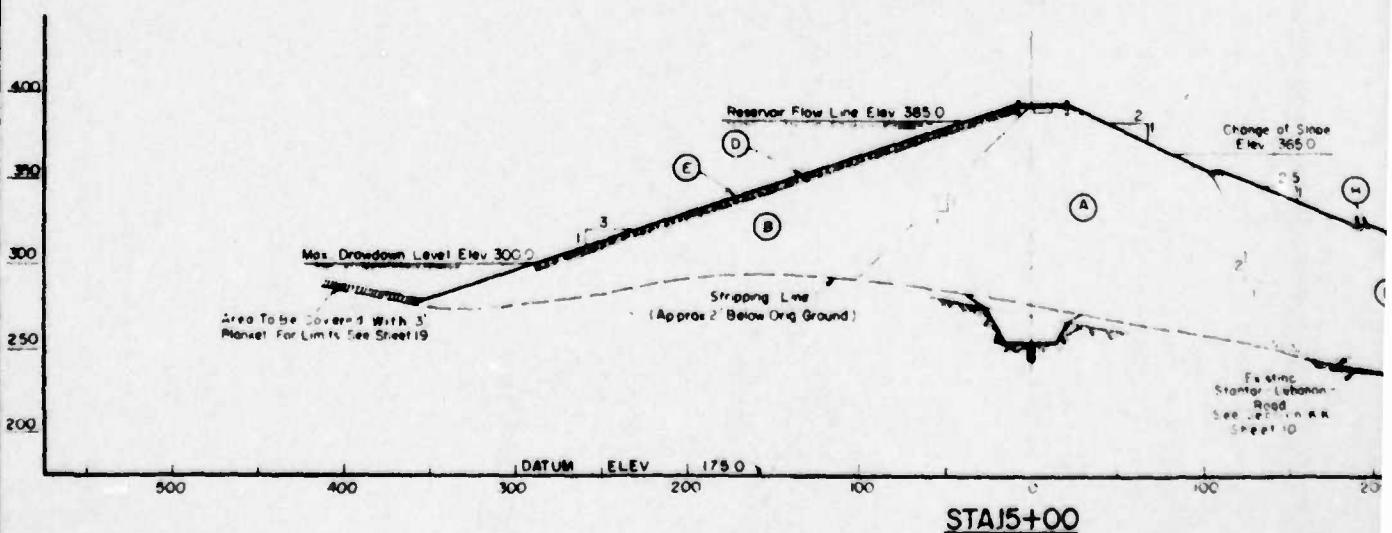
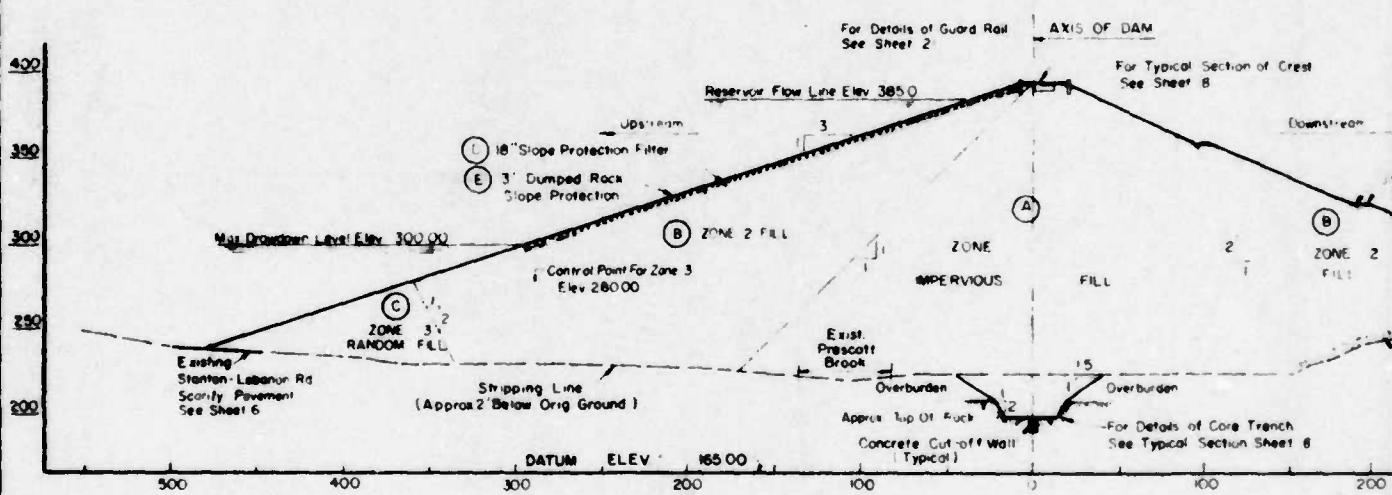
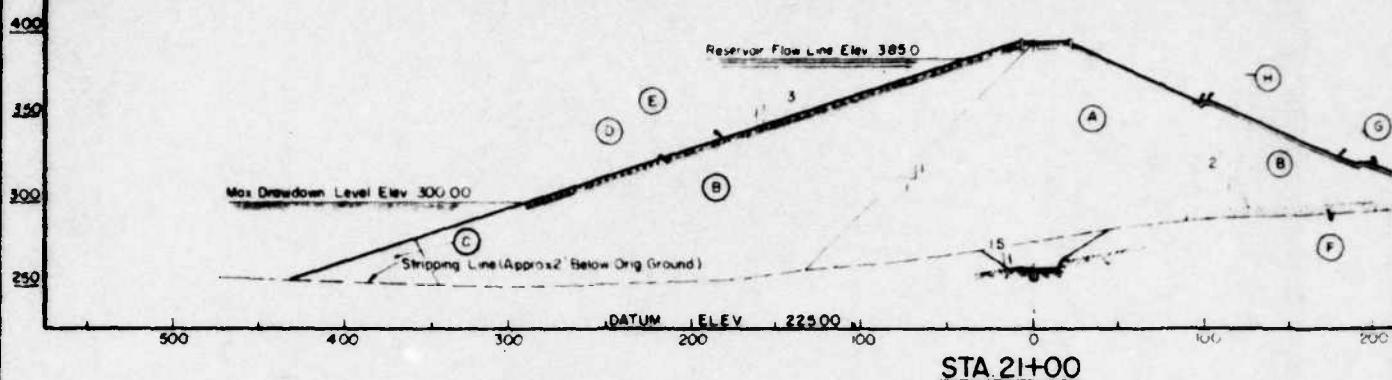
SOUTH DAM

PROFILE & TYPICAL SECTION

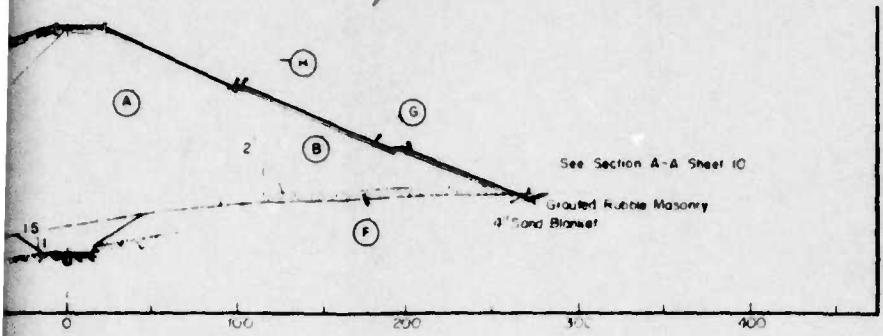
POTTER, URQUHART, MCCREARY, & O'BRIEN
CONSULTING ENGINEERS
NEWARK, N.J.
IN CHARGE C.F. GRASS
DRAWN BY [Signature] CHECKED BY [Signature]
S.J.J. B.J.J. L.C. DATE: Feb 14, 1961 ACC.P.M.M.C.

[Signature]
POTTER, URQUHART, MCCREARY & O'BRIEN

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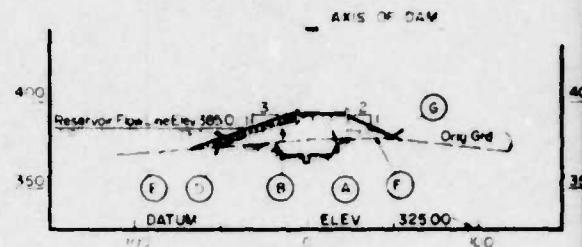


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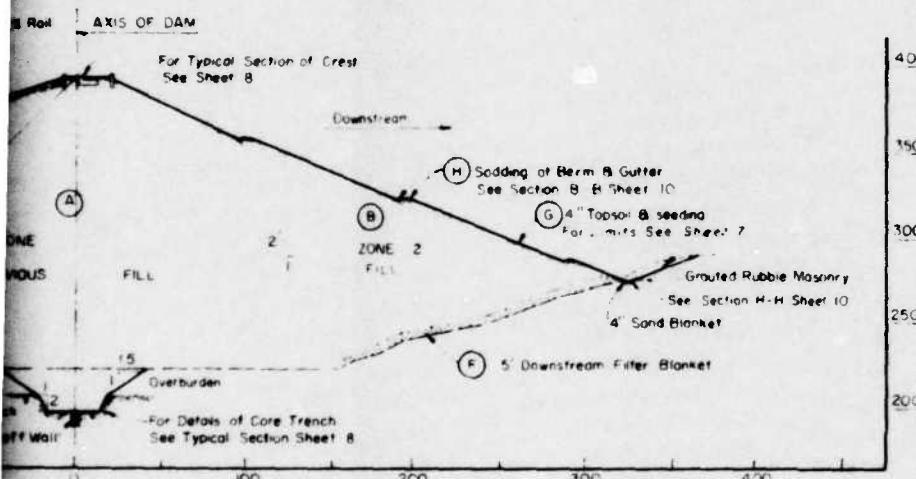


STA 21+00

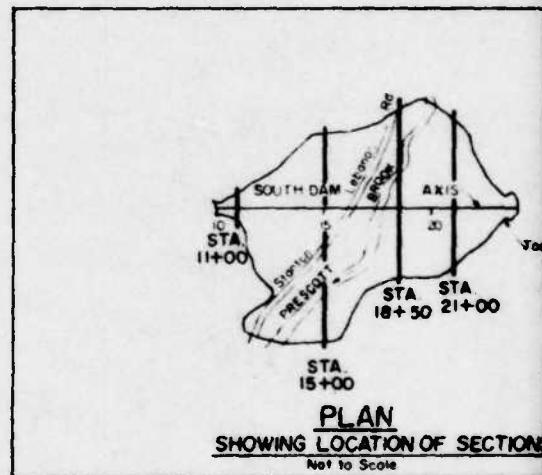
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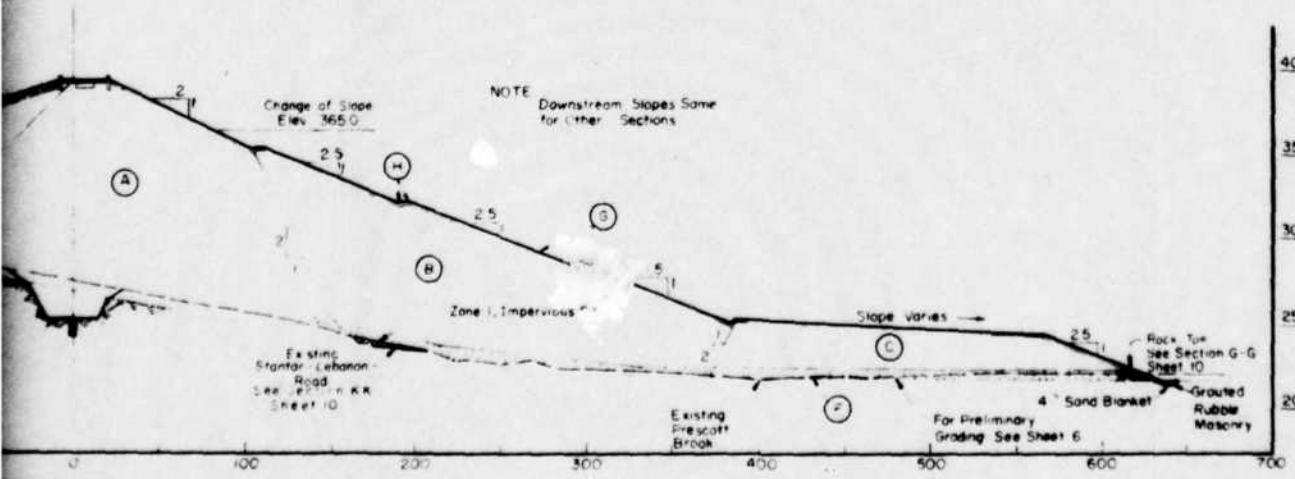
STA 11+00



STA 18+50



PLAN
SHOWING LOCATION OF SECTIONS
Not to Scale



STA 15+00

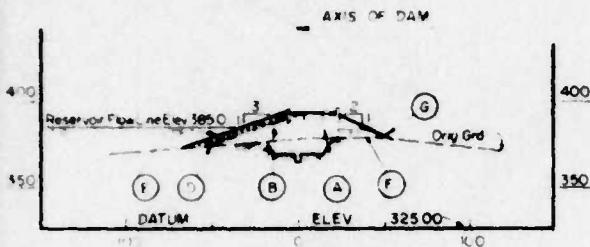
Walter J. Maier
CHIEF CONSTRUCTION ENGINEER
BUREAU OF DESIGN & CONSTRUCTION

E. J. Maier
PORTER, URQUHART, BRECKHALEY & O'BRIEN

FIGURE	
STATE OF	
DEPARTMENT OF CONSERVATION	
DIVISION OF WATERSHEDS	
ROUND VI	
CONTRACT RV-1	
TRANSVERSE FOR	
PORTER, URQUHART CONSULTING ENGINEERS	
IN CHARGE C.F. O'BRIEN	SCALE
DRAWN BY E. J. MAIER	CHECKED
TRACED BY	DATE
L.A.	L.C.

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3



STA 11+00

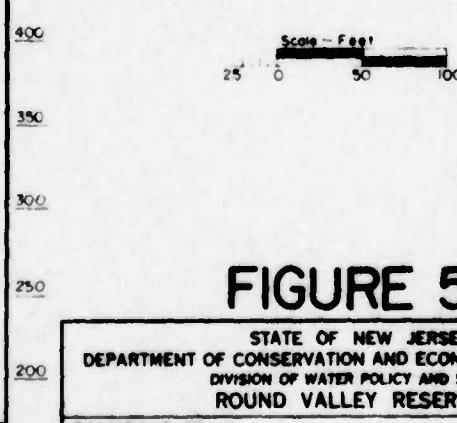
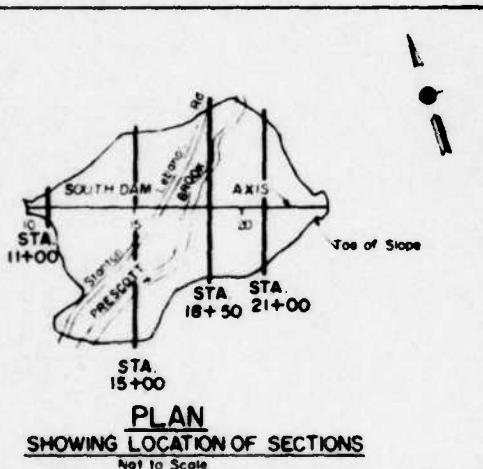
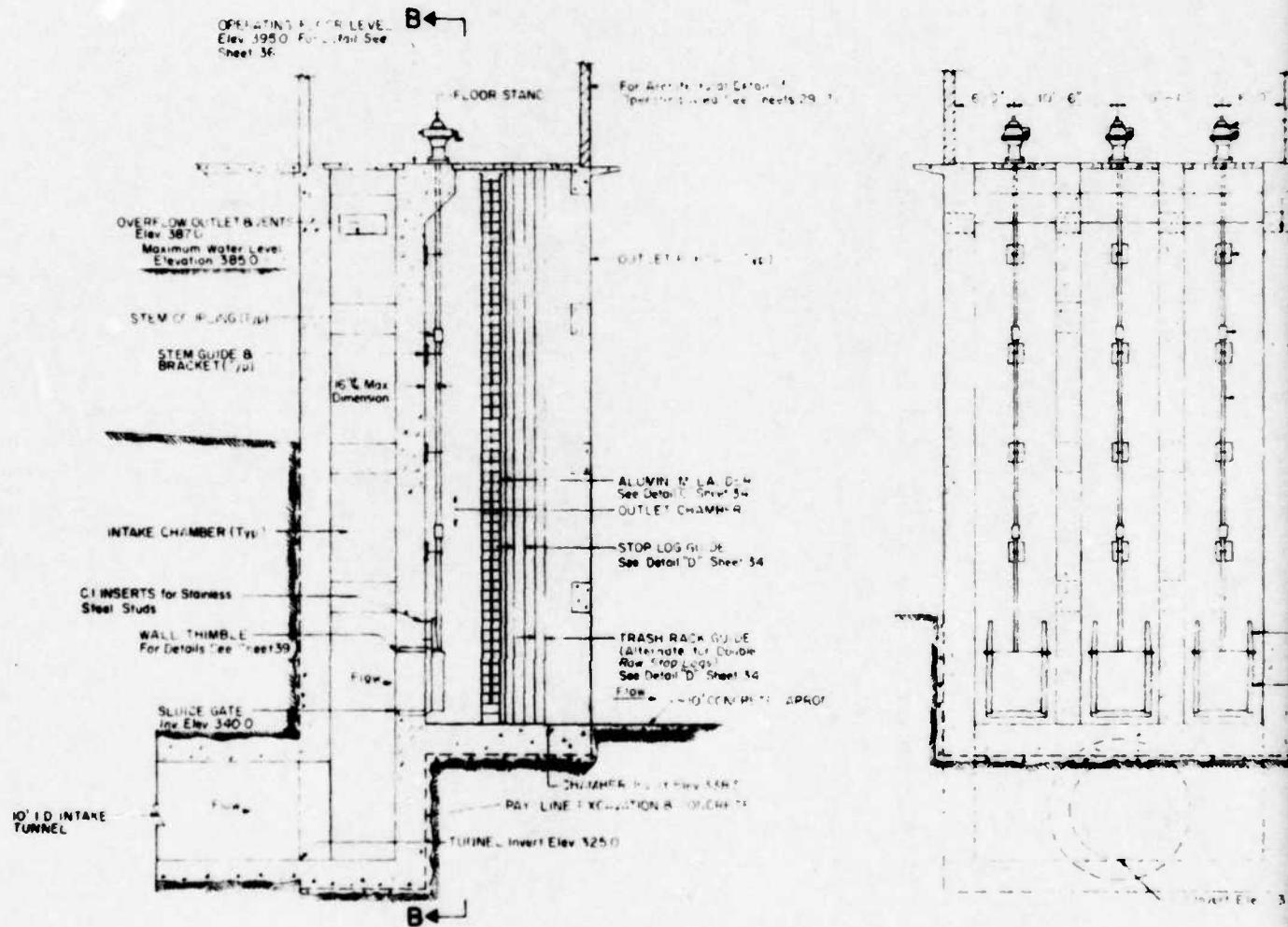


FIGURE 5

STATE OF NEW JERSEY		
DEPARTMENT OF CONSERVATION AND ECONOMIC DEVELOPMENT		
DIVISION OF WATER POLICY AND SUPPLY		
ROUND VALLEY RESERVOIR		
CONTRACT RV-1		SOUTH DAM
TRANSVERSE SECTIONS FOR EMBANKMENT		
PORTER, UROUHART, MCCREARY, & O'BRIEN CONSULTING ENGINEERS NEWARK, N.J.		
IN CHARGE OF DRAWING	SCALE: 1" = 50'	SHEET 9 of 40
DRAWN	TRACED	CHECKED
LA	LA	LC
DATE: Feb 14, 1961		
ACC P.U.M.O.-108		

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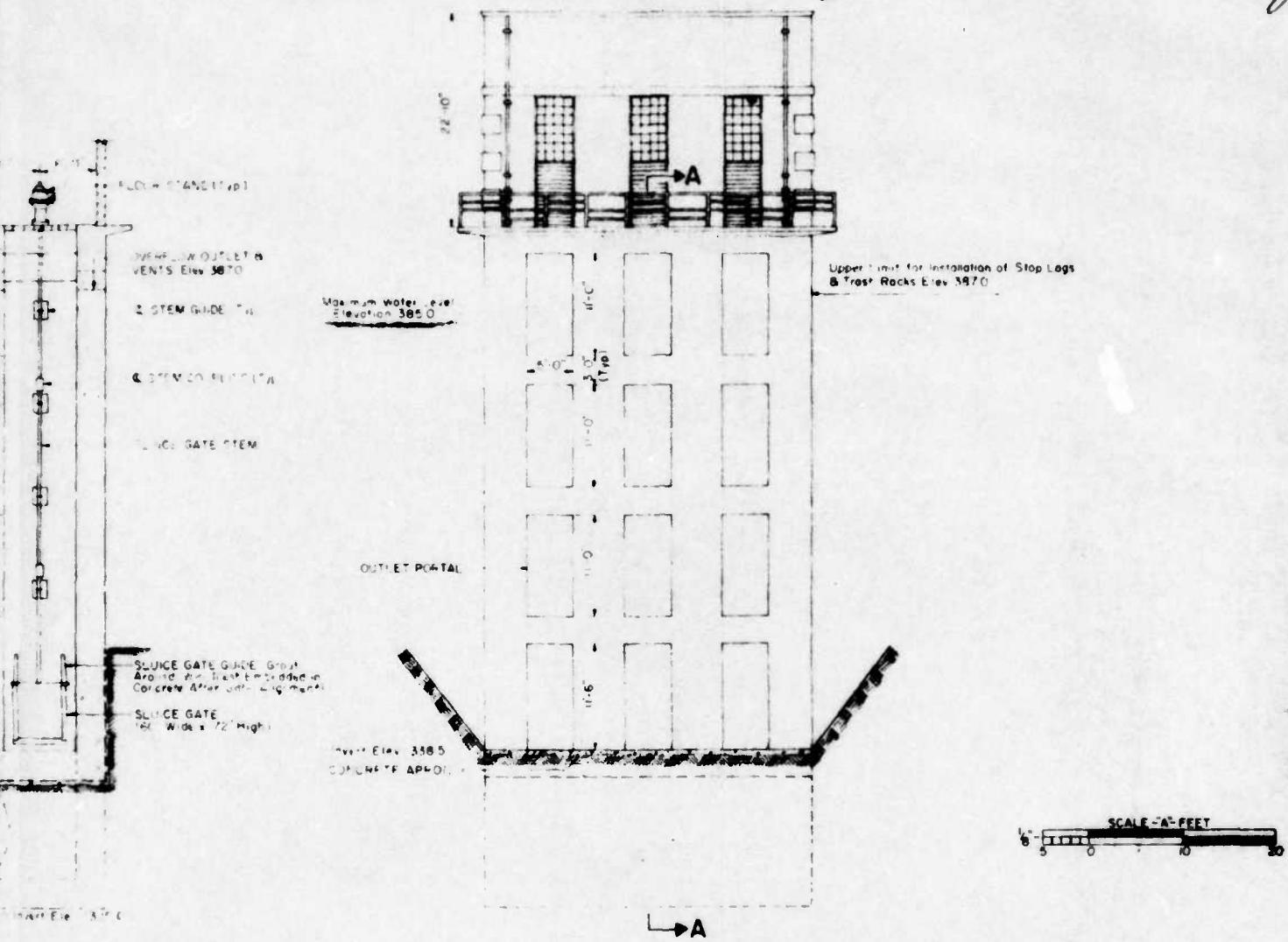
SECTION A-A

50-1786

SECTION B-B

S-A-E-A

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B-B

NORTH ELEVATION

SCALE "A"

FIGURE 6

STATE OF NEW JERSEY		
DEPARTMENT OF CONSERVATION AND ECONOMIC DEVELOPMENT		
DIVISION OF WATER POLICY AND SUPPLY		
ROUND VALLEY RESERVOIR		
CONTRACT RV-1		SOUTH DAM
INTAKE TOWER		
MECHANICAL SECTIONS & ELEVATION		
PORTER, URQUHART, McCREARY, & O'BRIEN		
CONSULTING ENGINEERS		
IN CHARGE C.F. GRIGG		SCALE: AS SHOWN
DRAWN:	TRACED	CHECKED
M.D.V.	M.D.V.	J.E.C.
DATE: Feb 14, 1961		
ACC. PUMO-1		

Walter O. Ream
CHIEF CONSTRUCTION ENGINEER
BUREAU OF DESIGN & CONSTRUCTION

John
PORTER, URQUHART, McCREARY, & O'BRIEN
CONSULTING ENGINEERS

APPENDIX

FIELD INSPECTION

REPORT

Check List
Visual Inspection
Phase 1

Mr. Larry Woscyna
Mr. John Garofalo
New Jersey DEP

Name Dam Round Valley South Dam County Hunterdon

State New Jersey

Coordinators

Date(s) Inspection 4/19/78 Weather Rainy Temperature 45°
4/24/78 Clear 55°

Pool Elevation at Time of Inspection 381 M.S.L.

Tailwater at Time of Inspection --- M.S.L.

Inspection Personnel:

A-1 Mr. John J. Williams

Mr. Albert Depman

Mr. George Elias

Mr. David Campbell

Mr. Anthony Geiss

Mr. David Campbell

Recorder

Accompanied by:

Mr. Albert DePhilipe, Chief of Foundations and Materials Branch, US Army Corps of Engineers, Phila. District.
Mr. A. Gregory Chase, Supervising Engineer, New Jersey Dept. of Environmental Protection, Division of Water Resources.

Mr. Walter O'Rourke, Supervisor of Reservoirs, New Jersey Dept. of Environmental Protection, Division of Water Resources.

Mr. John Garofalo, Civil Engineer, New Jersey Dept. of Environmental Protection.

Mr. Larry Woscyna, Civil Engineer, New Jersey Dept. of Environmental Protection.

EMBANKMENT

VISUAL EXAMINATION OF	OBSERVATIONS	REMARKS OR RECOMMENDATIONS
SURFACE CRACKS	None noted.	None.
UNUSUAL MOVEMENT OR CRACKING AT OR BEYOND THE TOE	None noted.	None.
A-2 SLOUGHING OR EROSION OF EMBANKMENT AND ABUTMENT SLOPES	Minor erosion of the reservoir shoreline near the east abutment. Sloughing of embankment near the junction with the east abutment below the third berm from the top.	Area of sloughing should be filled and graded. The area should be monitored for further movement.
VERTICAL AND HORIZONTAL ALINEMENT OF THE CREST	No problems noted.	None.
RIPRAP FAILURES	Gradation of the riprap is poor. Large angular stone (2 to 4 feet in diameter) is mixed with small stone and gravel (6 inches or less), with very little intermediate sized stone. The stone sizes are segregated in some areas.	The rip-rap should be graded more evenly, and supplemented as necessary.

Sheet 4

EMBANKMENT

VISUAL EXAMINATION OF

OBSERVATIONS

REMARKS OR RECOMMENDATIONS

**FUNCTION OF EMBANKMENT
AND ABUTMENT, SPILLWAY
AND DAM**

No problems noted.

ANY NOTICEABLE SEEPAGE
A-3

Seepage was noted at several locations, and much of the embankment was moist or saturated. The seepage appeared to be most prevalent near the east abutment.

The cause of seepage and areas of saturation should be determined.

STAFF GAGE AND RECORDER

The North Dam outlet tower is equipped with a Stevens paper chart recorder. The paper chart was not operating at the time of inspection.

None.

DRAINS

According to the drawings, the dam is equipped with a filter blanket drain. The drain is beneath the embankment, and could not be observed. However, seepage flow noted at the toe of the embankment is estimated at 1 cfs.

None.

VISUAL EXAMINATION OF APPURTENANT STRUCTURES	OBSERVATIONS	REMARKS OR RECOMMENDATIONS
CRACKING AND SPALLING OF CONCRETE SURFACES IN CONDUIT	The 10 foot diameter concrete-lined tunnel is in excellent condition.	None.
INTAKE STRUCTURE	The intake tower is in excellent condition. Some insignificant seepage was noted at the base of the tower.	None.
OUTLET STRUCTURE	A valve vault for a 36" outlet pipe is located at the downstream toe of the embankment. It is in excellent condition, and supplements flow to Prescott Brook to provide for the minimum conservation discharge.	The conservation discharge to Prescott Brook is .83 mgd.
OUTLET CHANNEL	Prescott Brook originates at the toe drain of the South Dam. About 100 feet below the toe of the dam is a calibrated weir for measurement of discharges.	None.
EMERGENCY GATE		None.

INSTRUMENTATION		REMARKS OR RECOMMENDATIONS
VISUAL EXAMINATION	OBSERVATIONS	
MONUMENTATION/SURVEYS		
OBSERVATION WELLS		
WEIRS	A rectangular weir with a removable 'V' notch section is constructed across Prescott Brook.	
PIEZONETERS		
OTHER		

<u>VISUAL EXAMINATION OF</u>	<u>RESERVOIR</u>	<u>REMARKS OR RECOMMENDATIONS</u>
	<u>OBSERVATIONS</u>	
<u>SLOPES</u>	The slopes are moderate and well covered with trees and brush. The slopes do not appear to affect the safety of the dam.	None.
<u>SEDIMENTATION</u>	The reservoir is pumped storage, so sedimentation would not appear to be a problem.	None.

VISUAL EXAMINATION OF

DOWNTSTREAM CHANNEL

OBSERVATIONS

REMARKS OR RECOMMENDATIONS

CONDITION
(OBSTRUCTIONS,
DEBRIS, ETC.)

No obstructions or unusual conditions
were noted.

None.

SLOPES

Slopes along the downstream channel are
generally mild, and are well covered with
trees and brush.

None.

A-7 APPROXIMATE NO.
OF HOMES AND
POPULATION

Approximately 50 homes are located in the
proximity of Prescott Brook from the South
Dam to the South Branch Raritan River.

None.

<u>ITEM</u>	<u>REMARKS</u>
MONITORING SYSTEMS	Personnel from the New Jersey Department of Environmental Protection, Division of Water Resources, operate and monitor operation of the reservoir.
MODIFICATIONS	Stone rubble drainage gutters in the berms were replaced with concrete gutters in 1970.
HIGH POOL RECORDS	Maximum pool of record was 385.0 in August of 1975.
POST CONSTRUCTION ENGINEERING STUDIES AND REPORTS	None noted.
PRIOR ACCIDENTS OR FAILURE OF DAM DESCRIPTION REPORTS	None noted.
Maintenance OPERATION RECORDS	None noted.

ITEM	REMARKS
DESIGN REPORTS	See next page.
GEOLOGY REPORTS	See next page.
DESIGN COMPUTATIONS HYDROLOGY & HYDRAULICS DAM STABILITY SEEPAGE STUDIES	See next page.
A-9 MATERIALS INVESTIGATIONS BORING RECORDS LABORATORY FIELD	See next page.
POST-CONSTRUCTION SURVEYS OF DAM	Unknown.
BORROW SOURCES.	Impervious material from the valley floor, and semipervious material from the valley rim.

May 4, 1978

Mr. Gregory Chase
Supervising Engineer
Bureau of Water Facility Operations
P.O. Box 5196
Clinton, NJ 08809

Dear Mr. Chase:

Thank you for your cooperation in the Phase I Inspection of the Round Valley Reservoir structures. Below is a list of the documents on loan from your office for this investigation:

By Porter, Uraquhart, McCreary & O'Brien:

- 1) Report on Experimental Grouting, March, 1960.
- 2) Round Valley Reservoir, Design Analysis for South Dam, December, 1959.
- 3) Round Valley Reservoir, Design Analysis for Dike, December, 1959.
- 4) Round Valley Reservoir, Design Analysis for North Dam, December, 1959.
- 5) Outlet Tower, Design Calculations, December, 1959.
- 6) Intake Tower, Design Calculations, June, 1960.
- 7) Engineering Geology of the Round Valley Reservoir, Books 1 & 2, September, 1960.
- 8) Report of Laboratory Test Results, December, 1959.

By Whitman, Requardt & Associates:

Appendices to the Engineering Report, Spruce Run - Round Valley Reservoir Project, September, 1958.

By Fred L. Fox:

Final Report, Soils Operations & Control, January, 1963.

Sincerely,

O'BRIEN & GERE ENGINEERS, INC.
JUSTIN & COURTNEY DIVISION

David B. Campbell
Design Engineer

DEC/pc

PHOTOGRAPHS



VIEW OF RIP RAPPED SLOPE
SHOWING POOR GRADATION



STANDING WATER ABOVE BOTTOM BERM NEAR
EAST ABUTMENT

HYDROLOGIC AND HYDRAULIC CALCULATIONS

JUSTIN & COURTNEY, INC.
Division of O'Brien & Gere Engineers, Inc. SHEET NO. 1 OF 1
PHILADELPHIA, PA

NAME OF CLIENT CORPS OF ENGINEERS
PROJECT ROUND VALLEY
DATE 3/13/78
COMP. BY DBC
CHECKED BY LW

PMP HYDROLOGY

DRAINAGE AREA \approx 5.4 SQUARE MILES

RESERVOIR SURFACE AREA \approx 3.6 SQUARE MILES

6-HOUR 10 SQUARE MILE PMP = 26"
ZONE = 6

THE DRAINAGE AREA IS LESS THAN 10 SQUARE MILES,
SO NO REDUCTION REFLECTING BASIN SIZE IS INCLUDED.

A REDUCTION OF 20% IS INCLUDED TO
ACCOUNT FOR IMPERFECT FIT OF BASIN AND
STORM ISOHYETALS.

. 6-Hour PMP = 20.8"

48 HOUR PMP = $1.26 \times 20.8 = 26''$

SINCE 2/3 OF THE BASIN IS RESERVOIR SURFACE,
AND NO OUTFLOW IS CONSIDERED, IS 48 HOUR
PMP IS APPLIED TO THE RESERVOIR WITH LOSSES
CONSIDERED ONLY FOR THE OVERBANK AREA.

RAINFALL ON THE RESERVOIR 26"

RAINFALL ON THE OVERBANKS 26"
LOSSES (CN=60) 6.5"
RUNOFF FROM OVERBANKS 19.5"

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JUSTIN & COURTNEY, INC.
Division of O'Brien & Gere Engineers, Inc. SHEET NO. 2 OF _____
PHILADELPHIA, PA

NAME OF CLIENT CORPS OF ENGINEERS
PROJECT ROUND VALLEY
DATE 3/13/78
COMP. BY DBC
CHECKED BY LW

TOTAL RISE IN RESERVOIR ELEVATION

$$3.6 \text{ S.M.} \times 26'' + 1.8 \text{ S.M.} \times 19.5'' = 36''$$

$$36 \text{ S.M.} = 3 \text{ FEET}$$

FREEBOARD CALCULATION

FROM DESIGN OF SMALL DAMS, P.273.

FETCH \approx 1.5 MILES

WIND VELOCITY 50 MPH

\therefore WAVE HEIGHT = 2.9 FEET

WAVES \approx RUNUP

$1.5 \times 2.9' = 4.4'$ ABOVE THE MAXIMUM
WATER SURFACE, OR 7.4' ABOVE THE
MAXIMUM OPERATING POOL.

THE EMBANKMENT IS PROVIDED WITH 10.5' OF
FREEBOARD ABOVE THE MAXIMUM OPERATING
POOL, SO THE FREEBOARD ALLOWANCE IS
ADEQUATE.

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PREVIOUS INSPECTION REPORTS

P. II +
5

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February 5, 1970

H. W. Acken

V. 1. 1. 1. 1. 1. 1. 1.
J. Gen. Bl. 1. 1. 1. 1. 1. 1. 1.

Michael J. Galley

Summary - Force Main and Tunnel Inspection and Status of
Weir Construction Program.

On December 16, 1969, Robert M. Munger, Haig Kasabach, Fergus Lynch and the writer inspected the South Dam intake tunnel and a portion of the force main. What appeared to be leakage into the force main was observed, from a distance, upstream near the Prescott Brook take-off line. Several small pin-hole leaks of apparent ground water leakage into the tunnel were noted at the bottom of the butt lap joint of the steel liner with the concrete tunnel. Numerous hair line cracks were noted in the concrete tunnel portion of the tunnel with considerable signs of efflorescence. One pin hole leak was also noted in the tower bay wall near the tunnel outlet.

For safety reasons, further close-up inspection of the force main leakage was delayed until the next upstream manhole cover was removed.

On January 7, 1970, after considerable difficulty in removing the cover bolts to the lower access manhole, an inspection of the force main at the Prescott Brook take-off line was made and disclosed no leakage. It was later determined that, due to valve operation by pump station personnel, water slipping past an improperly closed valve was allowing water from the 36" diameter South Dam drain line to enter the force main at the Prescott Brook take-off.

On January 9, 1970, R. M. Munger and Evan Savidge inspected the pin hole seepage reported above to determine if repairs were feasible.

On January 15, 1970, in conference with Mr. Shanklin, H. W. Acken, Haig Kasabach, and Robert L. Hardman, a report was made concerning the impracticality of repairing the above noted pin-hole seeps and Mr. Shanklin gave his approval to resal the force main and resume pumping when water was available.

H. W. Acken

- 2 -

February 5, 1970

On January 28, 1970, the South Dam temporary measuring weir records to date were submitted to R. L. Hardman. Copy of memo attached.

On January 29, 1970, the writer instructed Ted Frank to start preparation of preliminary plans for the proposed permanent measuring weir. Copy of memo is attached.

On January 30, 1970, pumping was resumed.

South Dam seepage flows will continue to be monitored over the temporary wooded measuring weir until construction of the new concrete weir.

Attached are copies of memorandums by Haig Kasabach concerning his end of the seepage investigation.

A composite map of the South Dam area showing the measured location of the toe drain seeps was given to Haig Kasabach. Unfortunately for us, it is the only copy with that information.

CC Bureau file
Ted Frank

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Dam Inspection Report

Round Valley Reservoir
South Dam - Application No. 546

A joint inspection was made by Michael Galley, Chief, Bureau of Water Supply; three Supervising Engineers of that Bureau; Haig Kasabach, Geologist; and by the writer on October 30, 1970.

Before inspection of the dam, Mr. Galley presented a graph indicating water surface elevation in the reservoir from August 1969 to October 1970 and also seepage flow measurements for the same period of time.

He also apprised of the downstream erosion of the embankment by surface run-off.

The writer pointed out the need for clearing brush downstream of the embankment and for proper maintenance thereof.

The inspection disclosed that the berms do not have a proper slope to drain off rain water, and by examining the eroded area, the writer found loose and not well compacted soil which gives an impression of poor construction.

It is recommended that the dam embankment be kept clear of brush at all times and that the dam be maintained, if possible, on a day to day basis.

It was agreed that the dam should be inspected again after removal of brush from the face of the embankment.


S. A. Aziz, Principal Engineer

SAA/jmb
Trenton, NJ
November 5, 1970

201-1156

**EN
DAT
FILM**

VISUAL EXAMINATION OF

CONDITION
(OBSTRUCTIONS,
DEBRIS, ETC.)

SLOPES

A-7
APPROXIMATE NO.
OF HOMES AND
POPULATION

ITEM

MONITORING SYSTEM

MODIFICATIONS

HIGH POOL RECOIL

POST CONSTRUCTION STUDIES AND REPORTS

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PRIOR ACCIDENTS
DESCRIPTION
REPORTS

MAINTENANCE
OPERATION
RECORDS

ITEM

DESIGN REPORTS

GEOLOGY REPORTS

DESIGN COMPUTATIONS
HYDROLOGY & HYDRAULICS
DAM STABILITY
SEEPAGE STUDIES

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MATERIALS INVESTIGATIONS
BORING RECORDS
LABORATORY
FIELD

POST-CONSTRUCTION

BORROW SOURCE

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On January 9, 1970, R. M. Munger and Evan Savidge inspected the pin hole seepage reported above to determine if repairs were feasible.

On January 15, 1970, in conference with Mr. Shanklin, H. W. Acken, Haig Kasabach, and Robert L. Hardman, a report was made concerning the impracticality of repairing the above noted pin-hole seeps and Mr. Shanklin gave his approval to reseal the force main and resume pumping when water was available.

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SAA/jmb
Trenton, NJ
November 5, 1970

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